portion of said second electrode is disposed on said second insulating portion.

23 ~~18~~. A method according to Claim 22 ~~16~~, wherein said step of fabricating said electrodes includes the steps of forming said electrodes from a material which absorbs thermal energy and which is in thermal communication with said amorphous silicon portion, and forming said electrodes to be sufficiently thin so that they are substantially absorbing to infrared radiation.

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REMARKS

The specification has been amended, and Claims 10-11, 14-15, 17 and 19-27 have been canceled. Claims 1-3, 6, 12-13 and 16 have been amended. Claims 4-5, 7-9, and 18 remain in the application unchanged, and Claims 28-37 have been added. Claims 1-9, 12-13, 16, 18 and 28-37 are thus present in the application. Reconsideration of the application, as amended, is respectfully requested.

Allowable Subject Matter

Noted with appreciation is the indication in the Office Action that Claim 12 recites allowable subject matter, and would be allowed if rewritten in independent form. Claim 12 depended from Claims 1 and 10, and the foregoing amendments therefore introduce into Claim 12 the limitations of Claims 1 and 10, in order to place Claim 12 in independent form. Claim 12 should thus now be in proper condition for allowance, and notice to that effect is respectfully requested.

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Claims 2, 3, 6 and 13 have each been amended so that Claims 2-9 and 13 all depend from allowable Claim 12. Claims 2-9 and 13 should thus all be allowable with Claim 12, and notice to that effect is respectfully requested.

The foregoing amendments add new Claim 28. Claim 28 is a method claim, but includes limitations similar to those set forth in allowable apparatus Claim 12. Claim 28 is therefore believed to be allowable for the same basic reasons as Claim 12, and notice to that effect is respectfully requested.

New Claims 29-31 each depend from Claim 28, and are believed to be allowable therewith.

Comment on Statement of Reasons for Allowance

In the third paragraph on page 10, the Examiner offers a statement of reasons for the allowance of Claim 12. Applicants agree that Claim 12 is allowable. However, Applicants believe that the Examiner's statement of one reason supporting the allowability of Claim 12 should not be interpreted to mean that this is the only reason which supports the allowability of Claim 12.

Restriction Requirement

Pages 3-4 of the Office Action discuss a restriction requirement. In particular, the Examiner telephoned the undersigned on July 8, 2002, and presented a restriction requirement between (1) Claims 1-19, and (2) Claims 20-27. Applicants elected Claims 1-19 by telephone, with traverse. Applicants hereby confirm the election of Claims 1-19, and withdraw the provisional traverse made by telephone.

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Applicants would like to point out that the discussion of the restriction requirement on pages 3-4 of the Office Action is somewhat confusing. In particular, the Office Action talks about the restriction requirement as if it were an election of species requirement, rather than a restriction requirement. A restriction requirement is different from an election of species requirement. A restriction requirement involves selection from among two or more specified groups of claims, whereas an election of species requirement involves selection from among two or more specified groups of species (where each species is typically identified by the drawing figure which depicts it). In this regard, the attention of the Examiner is respectfully directed to MPEP §806.04(e), which emphasizes that: "Claims are definitions of inventions. *Claims are never species . . . Species are always the specifically different embodiments.*" The requirement presented to Applicants by telephone involved an election among groups of claims, rather than an election among species (i.e. drawing figures). Consequently, what the Examiner presented was a restriction requirement, rather than an election of species requirement. To the extent that the Office Action talks about procedural requirements which apply to an election of species requirement but not to a restriction requirement, the discussion is confusing. Applicants have complied with the procedural requirements that apply to a restriction requirement.

Objection to Drawings

In the paragraph bridging pages 4-5, the Office Action raises an objection to the drawings, asserting that the drawings do not include certain reference numerals that appear

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in the specification, which are reference numerals 142, 143, and 146. This objection is respectfully traversed, because these three reference numerals actually do appear in the drawings (in FIGURE 17). Nevertheless, and to avoid confusion, Applicants are proposing that these reference numerals be added to an additional figure, which is FIGURE 15.

In particular, Applicants are enclosing a photocopy of FIGURE 15, with a proposed change marked in red ink, in the form of the addition of reference numerals 142, 143, and 146 with respective lead lines. Approval of this drawing change is respectfully requested. If this change is approved by the Examiner, a corrected formal drawing which includes this change will be submitted in due course.

Objection to Specification

Page 5 of the Office Action raised an objection to the specification, correctly noting that "11-11" on page 21 should actually be "15-15". The foregoing amendment to the specification corrects this inadvertent typographical error.

Rejection under 35 U.S.C. §112

Page 5 of the Office Action rejected Claims 2 and 17 under the first paragraph of 35 U.S.C. §112, asserting that they recite subject matter which was not disclosed in the originally-filed application papers. Although Claim 17 has been canceled, the language which appeared in Claim 17 is now present in new Claim 29. This ground of rejection is respectfully traversed for the following reasons.

First, it is well-established that originally-filed claims of the type involved here are part of the originally-filed disclosure. Consequently, it is not appropriate for an

originally-filed claim to be rejected on the ground that it recites subject matter which was not present in the originally-filed application papers, because the subject matter of an originally-filed claim is an integral part of the original disclosure, and effectively serves as support for itself.

Second, in discussing the word "resistance", the present rejection takes this word out of the context in which it is used in the claims. In more detail, the rejection discusses the word "resistance" as if it applied solely to the amorphous silicon portion, indicating that it is not clear how the resistance of the amorphous silicon portion could be set in a manner substantially independent of the doping level of the amorphous silicon portion. However, this is not consistent with the actual language of the claims.

In particular, with due regard to antecedent relationships, the claims in question use the phrase "said resistance" to refer to a prior definition in the claims of "resistance", where this term is defined to mean the resistance between the recited first and second electrodes. The resistance between these electrodes is determined in part by the resistance of the amorphous silicon (which is a function of the doping level), but is also determined in part by other factors, such as the structural configuration of the electrodes and amorphous silicon portion. With this in mind, it is respectfully submitted that the disclosure of the present application provides a person skilled in the art with sufficient guidance to permit fabrication of an apparatus in which the resistance between the electrodes can be set substantially independently of the doping of the amorphous silicon portion.

For these reasons, it is respectfully submitted that the subject matter in question is in fact disclosed in the present application in a manner which complies with the first paragraph of §112, notice to that effect is respectfully requested.

Independent Claims 1 and 16

Independent Claims 1 and 16 were each rejected under 35 U.S.C. §102 as anticipated by Vilain U.S. Patent No. 5,912,464. Claims 1 and 16 have each been amended so as to more clearly emphasize why the subject matter of these claims is different from the Vilain patent. In this regard, Claim 1 now recites "first and second insulating portions provided at spaced locations on said amorphous silicon portion", with "a substantial portion of said first electrode being disposed on said first insulating portion, and a substantial portion of said second electrode being disposed on second insulating portion". Amended Claim 16 include comparable language. The Vilain patent teaches away from this configuration. For example, in the text at lines 21-26 in column 13, Vilain explains that it is disadvantageous to have an insulating layer between an electrode and a thermally sensitive material. Therefore, since Claims 1 and 16 each now include a recitation of insulating portions in a configuration that Vilain asserts is undesirable, it is respectfully submitted that Claims 1 and 16 are not anticipated by Vilain, and would not be obvious in view of Vilain.

In rejecting claims other than Claims 1 and 16, the Office Action relied on Kimura U.S. Patent No. 5,589,688, and Agnese U.S. Patent No. 5,825,029. Kimura was relied on for the disclosure of a titanium-aluminum alloy, but Claims 1 and

16 do not recite such an alloy. Agnese was relied on for teaching a membrane having an opening, but Claims 1 and 16 do not recite this feature. It is therefore respectfully submitted that the indicated portions of Kimura and Agnese do not cure the deficiencies of Vilain with respect to Claims 1 and 16. Claims 1 and 16 are therefore believed to be allowable, and notice to that effect is respectfully requested.

Remaining Dependent Claims

Claims 32-37 and Claim 18 respectively depend from Claim 1 and Claim 16, and are also believed to be allowable over the art of record, for example for the same reasons set forth above with respect to Claims 1 and 16.

Second Information Disclosure Statement

Applicants are submitting concurrently with this Amendment a Second Information Disclosure Statement, along with the fee for submission of an IDS at this point in the examination process. Consideration of the IDS is respectfully requested.

Conclusion

Based on the foregoing, it is respectfully submitted that all of the pending claims are fully allowable, and favorable reconsideration of this application is therefore respectfully requested. If the Examiner believes that examination of the present application may be advanced in any way by a telephone conference, the Examiner is invited to telephone the undersigned attorney at (214) 953-6684.

Although Applicants believe that no additional fees are due, the Commissioner is hereby authorized to charge any fee required by this paper, or to credit any overpayment, to Deposit Account No. 02-0384 of Baker Botts L.L.P.

Respectfully submitted,
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Date: October 15, 2002

Enclosures:
- Marked-up specification paragraph
- Marked-up version of amended claims
- Copy of Figure 15 showing proposed changes in red ink
- Second Information Disclosure Statement, with enclosures
- Check ($180.00)
- Post card

MARKED UP SPECIFICATION PARAGRAPH

The paragraph which appears at lines 19-28 on page 21 of the specification has been amended in the following manner:

--- The membrane 141 is described in more detail with reference to FIGUREs 15-17. In this regard, FIGURE 15 is a diagrammatic sectional side view of the membrane 141 taken along the line [11-11] **15-15** in FIGURE 14, FIGURE 16 is a diagrammatic sectional plan view taken along the line 16-16 in FIGURE 15, and FIGURE 17 is a diagrammatic sectional side view taken along the line 17-17 in FIGURE 16. FIGURE 17 also diagrammatically depicts the reflective layer 42. For clarity in showing the present invention, FIGURE 17 is not to scale. ---

MARKED UP VERSION OF AMENDED CLAIMS

Please cancel Claims 10-11, 14-15, 17 and 19-27 without prejudice.

12. **(Amended)** [An apparatus according to Claim 10,] **An apparatus, comprising an infrared detector with a plurality of detector elements that each include:**

an amorphous silicon portion which has a selected temperature coefficient of resistance; and

first and second electrodes which are electrically coupled to said amorphous silicon portion at spaced locations thereon, said first and second electrodes and said amorphous silicon portion having a structural configuration which is selected to provide between said first and second electrodes through said amorphous silicon portion at a given temperature a resistance which is selected substantially independently of said temperature coefficient of resistance;

wherein said amorphous silicon portion is a layer having each of said first and second electrodes on one side thereof; and

including a third electrode on a side of said amorphous silicon layer opposite from said first and second electrodes, said third electrode having respective portions which are each aligned with a respective one of said first and second electrodes.

2. **(Amended)** An apparatus according to Claim [1] **12**, wherein said amorphous silicon portion has a level of doping selected to provide said amorphous silicon portion with said selected temperature coefficient of resistance; and

wherein said structural configuration of said electrodes and said amorphous silicon portion is selected to set said resistance substantially independently of said doping level.

3. **(Amended)** An apparatus according to Claim [1] **12**, wherein said first and second electrodes are made of a material which absorbs thermal energy, are in thermal communication with said amorphous silicon portion, and are sufficiently thin so that they are substantially absorbing to infrared radiation.

4. An apparatus according to Claim 3, wherein said electrodes are made from an alloy which includes aluminum and titanium.

5. An apparatus according to Claim 3, wherein said electrodes are made from an alloy which includes approximately equal amounts of aluminum and titanium.

6. **(Amended)** An apparatus according to Claim [1] **12**, wherein said infrared detector includes an integrated circuit, a membrane having therein an amorphous silicon portion and said electrodes, and structure which supports said membrane at a location spaced above said integrated circuit and which electrically couples each of said first and second electrodes to said integrated circuit.

7. An apparatus according to Claim 6,

wherein said integrated circuit has thereon below said membrane a reflective surface which reflects infrared radiation; and

wherein a distance between said reflective surface and said membrane is selected as a function of infrared wavelengths of interest, so that a region between said

membrane and said reflective surface will serve as a resonant cavity for said wavelengths of interest.

8. An apparatus according to Claim 7, wherein said membrane has therethrough a plurality of openings.

9. An apparatus according to Claim 8, wherein said openings each have a transverse dimension which is approximately twice said distance.

13. **(Amended)** An apparatus according to Claim [10] 12, including spaced first and second layers made of a material which is electrically insulating and substantially transparent to infrared radiation, said amorphous silicon layer and said electrodes being disposed between said first and second layers.

28. **(New)** A method of making an infrared detector having a plurality of detector elements, comprising the steps of:

providing an amorphous silicon layer which has a selected temperature coefficient of resistance;

fabricating first and second electrodes which are at spaced locations on one side of said amorphous silicon layer and which are electrically coupled to said amorphous silicon layer, including the step of structurally configuring said first and second electrodes and said amorphous silicon layer so as to provide between said first and second electrodes through said amorphous silicon layer at a given temperature a resistance selected substantially independently of said temperature coefficient of resistance; and

fabricating a third electrode on a side of said amorphous silicon layer opposite from said first and second electrodes, said third electrode having respective portions which are each

aligned with a respective one of said first and second electrodes.

29. (New) A method according to Claim 28,

wherein said step of providing said amorphous silicon layer includes the step of doping said amorphous silicon layer to a level which provides said selected temperature coefficient of resistance; and

wherein said steps of fabricating said third electrode and configuring said first and second electrodes and said amorphous silicon layer are carried out so as to set said resistance substantially independently of said doping level.

30. (New) A method according to Claim 28, wherein said step of fabricating said first and second electrodes includes the steps of forming said first and second electrodes from a material which absorbs thermal energy and which is in thermal communication with said amorphous silicon layer, and forming said first and second electrodes to be sufficiently thin so that they are substantially absorbing to infrared radiation.

31. (New) A method according to Claim 28, further including the steps of:

supporting at a location spaced above an integrated circuit a membrane which has therein said amorphous silicon layer and said electrodes;

electrically coupling said first and second electrodes to said integrated circuit; and

providing on said integrated circuit below said membrane a reflective surface which reflects infrared radiation, wherein a distance between said reflective surface and said membrane is selected as a function of infrared wavelengths of interest, so that a region between said membrane and said reflective surface will serve as a resonant cavity for radiation having said wavelengths of interest.

1. **(Amended)** An apparatus, comprising an infrared detector with a plurality of detector elements that each include:

an amorphous silicon portion [which has a selected temperature coefficient of resistance];

first and second insulating portions provided at spaced locations on said amorphous silicon portion; and

first and second electrodes which are electrically coupled to said amorphous silicon portion at spaced locations thereon, [said electrodes and said amorphous silicon portion having a structural configuration which is selected to provide between said electrodes through said amorphous silicon portion at a given temperature a resistance which is selected substantially independently of said temperature coefficient of resistance] **a substantial portion of said first electrode being disposed on said first insulating portion, and a substantial portion of said second electrode being disposed on said second insulating portion**.

32. (New) **An apparatus according to Claim 1, wherein said first and second electrodes are made of a material which absorbs thermal energy, are in thermal communication with said amorphous silicon portion, and are sufficiently thin so that they are substantially absorbing to infrared radiation**.

33. (New) **An apparatus according to Claim 32, wherein said electrodes are made from an alloy which includes aluminum and titanium**.

34. (New) **An apparatus according to Claim 32, wherein said electrodes are made from an alloy which includes approximately equal amounts of aluminum and titanium**.

35. (New) An apparatus according to Claim 1, wherein said infrared detector includes an integrated circuit, a membrane having therein said amorphous silicon portion, said insulating portions and said electrodes, and structure which supports said membrane at a location spaced above said integrated circuit and which electrically couples each of said first and second electrodes to said integrated circuit.

36. (New) An apparatus according to Claim 35, wherein said integrated circuit has thereon below said membrane a reflective surface which reflects infrared radiation; and

wherein a distance between said reflective surface and said membrane is selected as a function of infrared wavelengths of interest, so that a region between said membrane and said reflective surface will serve as a resonant cavity for said wavelengths of interest.

37. (New) An apparatus according to Claim 1, wherein said first and second electrodes have interdigitated fingers.

16. **(Amended)** A method of making an infrared detector having a plurality of detector elements, comprising the steps of:

providing an amorphous silicon portion which has a selected temperature coefficient of resistance;

fabricating first and second insulating portions at spaced locations on said amorphous silicon portion; and

fabricating first and second electrodes which are at spaced locations on said amorphous silicon portion and which are electrically coupled to said amorphous silicon portion, including the step of structurally configuring said electrodes [and said amorphous silicon portion so as to provide between said electrodes through said amorphous silicon portion at a given temperature a resistance selected substantially

independently of said temperature coefficient of resistance] **so that a substantial portion of said first electrode is disposed on said first insulating portion, and a substantial portion of said second electrode is disposed on said second insulating portion**.

18. A method according to Claim 16, wherein said step of fabricating said electrodes includes the steps of forming said electrodes from a material which absorbs thermal energy and which is in thermal communication with said amorphous silicon portion, and forming said electrodes to be sufficiently thin so that they are substantially absorbing to infrared radiation.